

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.

1 504 138

- (21) Application No. 39735/74 (22) Filed 12 Sept. 1974 (19)  
 (23) Complete Specification filed 6 Oct. 1975  
 (44) Complete Specification published 15 March 1978  
 (51) INT. CL.<sup>3</sup> F24C 3/04  
 (52) Index at acceptance  
 F4W 46A 46B  
 (72) Inventor GEOFFREY ARTHUR CHAMBERS



## (54) GAS FIRE

(71) We, C.H.R. (DEVELOPMENT) LIMITED, a British Company, formerly of 14, Willow Place, Shawbury, Shropshire SY4 4JB, and now of 24/25 Kings Street, Broseley, Shropshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a gas fire.

An object of this invention is to provide a gas fire which in use imparts a flame effect as in solid fuel appliances and can give a realization of warmth the moment the gas fire is lit.

According to the invention, there is provided a gas fire having radiant material which is horizontal or oblique to the horizontal and comprises a radiant, portions of which, in use, simulate, or bodies which, in use, simulate, embers, and which radiant material is situated above flame trap material of gauze or perforated sheet form extending across an upwardly-presented mouth of a plenum chamber which extends from side to side of the fire and with which communicates mixing means for mixing a flow of gaseous fuel with air, said flame trap material being such as to allow a gas/air mixture to pass upwardly therethrough, the arrangement being such that, in use, a gas/air mixture from the mixing means is diffused throughout the whole of the plenum chamber and passes up through said flame-trap material to said radiant material and burns at said radiant or between said bodies to give a moving flame effect above said radiant material and to cause said radiant material to glow.

The said radiant material may comprise a plurality of discrete radiant bodies which, in use, simulate embers and between which, in use, the gas/air mixture burns. Said bodies may be of various sizes and/or densities whereby in use to glow to different degrees according to their individual sizes and/or densities. Instead of the radiant material being a plurality of discrete radiant

bodies, there may be provided radiant material which comprises a radiant which is apertured to allow the gas/air mixture to pass through it, and integral portions of which, in use, simulate embers, and at which portions, in use, the gas/air mixture burns. There may be provided, in addition to the portions or bodies for simulating embers, log- or coal-simulating means, made of heat-resistant fire-proof material, disposed above the flame-trap material. Said log- or coal-simulating means may be of ceramic material which in use glows as if burning.

Also, according to the invention, there is provided a set of components for making a gas fire of the construction set forth in the penultimate preceding paragraph, said set of components comprising: (a) a unit constituting a base of the fire and having (i) a plenum chamber which extends from side to side of said fire base, (ii) mixing means, for mixing a flow of gaseous fuel with air, communicating directly with said plenum chamber, the arrangement being such that, in use, a gas/air mixture from the mixing means can diffuse throughout the whole of the plenum chamber, and (iii) flame trap material of gauze or perforated sheet form extending across a mouth of said plenum chamber, said flame trap material being constructed and arranged so that the gas/air mixture can pass upwardly therethrough for ignition thereabove and so that an exterior face of said flame trap material can support from beneath radiant material for simulating embers and disposed externally of the said unit; and (b) radiant material comprising a radiant, portions of which, in use, simulate, or bodies which, in use, simulate, embers, for placing upon said flame trap material whereby in use said gas/air mixture can burn to give a moving flame effect above said radiant material and cause said radiant material to glow.

In the accompanying drawings, which show, by way of example, two embodiments of the invention:

Figure 1 is a front view of a gas fire, constructed in accordance with the inven-

tion, suitable for a large domestic hearth or for a hotel, public house or restaurant;

Figure 2 is a plan view of the fire shown in Figure 1;

5 Figure 3 is a section on the line III—III, Figure 2;

Figure 4 is an end view of the fire shown in Figures 1 to 3;

10 Figure 5 is a plan view of a gas fire, constructed in accordance with the invention, for insertion into a standard domestic fireplace; and

Figure 6 is a side view of the fire shown in Figure 5.

15 Referring to Figures 1 to 4 of the drawings, a free-standing gas fire, for installation below a suitable chimney or flue, has a metal burner body which extends from side to side of the fire and is in the form of a plenum chamber of rectangular form in plan view. This chamber 1 is carried by supports (not shown), and has connected to it a venturi 2 from which a gas/air combustion mixture is supplied to said chamber 1. The venturi 2 receives air, constituting primary combustion air, from the atmosphere, and receives a gas supply, which may be of natural gas, through a supply pipe 3. The supply through the pipe is controlled through a valve 4 operable by a knob 5. The chamber 1 has an upwardly-presented mouth 6 which is completely covered by flame trap material in the form of a stainless steel twill-weave gauze 7. Extending from the rear of the chamber 1, but spaced short of the sides and front of the chamber 1, and spaced below the gauze 7, and above an inlet through which the gas/air mixture enters the chamber 1 from the venturi 2, is a metal baffle plate 8; and carried upon, and secured by pegging, glueing and screwing to, said gauze 7 is a heat-resistant block 9 which covers a central area of the gauze 7 and the purpose of which is: (a) to confine that area of the gauze 7 through which the gas/air mixture can pass (namely that area of said gauze which is beyond the periphery of said block 9) to a size compatible with the gas/air input; and (b) to form a platform and fixture block for hereinafter-described ceramic simulated logs. The top of the chamber 1 carries upstanding elongate parts in the form of metal strips, namely front and rear strips 10, 11 and side strips 12, which are each provided, above the level of the gauze 7, with a row of horizontally-spaced holes 13 for admission of secondary combustion air to the fire. The rear of the burner body carries brackets 14 for supporting an upstanding fire-brick (not shown). Provided at the front of the burner body is a pilot-light jet 16 connected to the gas supply via a pipe 17. There may be provided a flame-failure device whereby in known man-

ner the gas cannot be turned on if the pilot flame is out. Placed loosely on that part of the upper face of the gauze 7 which is not covered by the block 9 is radiant material in the form of a plurality of bodies 18, which are artificial bodies of ceramic material and which, in use, simulate wood embers. The bodies 18 are randomly arranged on said part of the upper face of the gauze, with there being left, however, sufficient space between them to allow efficient burning of the gas/air mixture between them when the first is in use. Mounted on the block 9 are a plurality of simulated logs 19 of heat-resistant fire-proof ceramic material. Five of these "logs" 19 are mounted directly on pegs on the block 9 and consist of two front "logs" 19a pointing in opposite directions obliquely towards the front corners of the fire and each having part of its length overhanging some of the "embers" 18 on the front part of the gauze, a central "log" 19b in the centre of the block 9 and pointing forwardly and likewise having part of its length overhanging some of the "embers" 18 on the front part of the gauze, and two "logs" 19c on the rear of the block 9, between the "logs" 19a and the firebrick at the rear of the fire. The positions of these five "logs" 19a to 19c are important for correct combustion of the gas in the embodiment now being described. The remaining "logs" 19 are not shown but are mounted by pegs above the logs 19a to 19c and are spaced from each other to allow burning space. Further radiant material, in the form of further "embers" 18, is placed in between the "logs" 19, again in such a way as to leave burning space.

When the fire is in use, the gas-air mixture from the venturi 2 is diffused through the whole of the plenum chamber 1 and then passes up through the gauze 7 and burns in between the "embers" 18 and in between the "logs" 19, there resulting a moving flame effect above the "embers" 18 and between the "logs" 19. The flames burn with a random pattern and there is obtained a dancing flame effect. As the gas-air mixture burns, the "embers" 18 glow, and the "logs" 19, or some of them, glow as if burning. The presence of the baffle 8, block 9, and the strips 12 prevent the occurrence of a natural "stack effect" such as would produce unwanted concentration of burning at the centre of the fire. The presence of the wall-like strips 10, 11, 12 tends to draw some of the burning gas towards said strips, but at the same time, however, the provision of the secondary air holes 13 in these strips prevents a too drastic negation of the "stack effect", and allows, in a pre-controlled manner, secondary air to enter that part of the fire which is immediately above the gauze, the arrangement being such

as to allow a certain amount of combustion to take place at the centre of the fire.

If desired the "embers" 18 may be of various sizes and/or densities, such as, in use, to glow to different degrees according to their individual sizes and/or densities.

If desired, the bodies 18 may, in use, simulate embers of a coke or coal fire and the "logs" 19 may be replaced by bodies which simulate relatively large pieces of coal.

The "embers" 18 may be of a natural material such as pumice or similar lava material from volcanic action, but better results appear to be obtained if the bodies 18 are artificial bodies of ceramic material, for example material prepared from ceramic fibres. The fire may have an upstanding ornamental metal grid (not shown) disposed forwards of the chamber 1.

The embodiment shown in Figures 5 and 6 is a fire for insertion into a standard size domestic fireplace and has a plenum chamber 20 which is carried by supports such as 21 and extends from side to side of the fire and has an upwardly-presented mouth 22 completely covered by a flame-trap gauze 23. The plenum chamber 20 has rearwardly-converging side walls 24, as shown in Figure 5, to suit the shape of said standard domestic fireplace and is inclined obliquely to the horizontal, as shown in Figure 6. Said chamber 20 is supplied with a gas/air combustion mixture through a venturi 25. The said embodiment has, as in the case of the embodiment shown in Figures 1 to 4, a baffle plate (not shown) beneath the gauze, and a heat-resistant block (here indicated at 26) secured to the top of the gauze. The block 26 has secured thereto five ceramic simulated "logs", such as 27, arranged in the same way as the "logs" 19a to 19c of the embodiment shown in Figures 1 to 4, and radiant material 28 in the form of ceramic bodies (similar to the bodies 18) simulating, in use, wood embers are randomly arranged on the gauze 23 and in between the "logs". Metal reflectors 29 extend along the sides and rear of the fire, and a supply-control knob 30 and a pilot jet, and a suitable guard (not shown), are provided at the front of the fire. In use, as in the case of the embodiment shown in Figures 1 to 4, the gas/air mixture from the venturi is diffused throughout the whole of the plenum chamber and then passes through the gauze and burns in between the embers and in between the "logs" whereby there results a dancing moving flame effect above the radiant material 28 and between the "logs" 27.

If desired, radiant material in a fire constructed in accordance with the present invention may comprise a one-piece radiant which is horizontal or oblique to the hori-

zontal and is of ceramic material, and integral portions of which are shaped to simulate, in use, embers, at which portions, in use, the gas/air mixture burns, there being provided in said one-piece radiant suitable apertures for the gas/air combustion mixture.

If a further exemplary embodiment (not shown), the fire is in the form of a fire having the same construction as that shown in Figures 5 and 6 except that the plenum chamber is rectangular in plan and somewhat larger, and except that the fire is provided with an ornamental metal grid extending in front of the "logs". There may also be provided a canopy with an outlet flue for connection to a chimney.

If desired, instead of the flame trap material in the above-described particular embodiments being gauze it could be of perforated sheet form; for example finely perforated stainless steel sheet.

The heat resistant block, 9 or 26, in the embodiments shown is conveniently made from vermiculite particles bonded and compressed into a board and sold under the trade name "Vicuclad" by W. Kenyon and Sons, of Duinkfield, near Manchester. Said block could, however, be made from any other suitable heat resistant material, including ceramic or refractory material.

There may be provided, for making the fire shown in Figures 1 to 4, a set of components comprising: (a) a unit constituting a base of the fire and comprising the chamber 1, the venturi 2, the pipe 3, the valve 4 operable by the knob 5, and the gauze 7; (b) the "embers" 18; and (c) the "logs" 19. Similarly, there may be provided, for making the fire shown in Figures 5 and 6, a set of components comprising: (a) a unit constituting the base of the fire and comprising the chamber 20, the venturi 25 with the supply control knob 30, and the gauze 23; (b) the radiant material 28 simulating embers; and (c) the "logs" such as 27.

#### WHAT WE CLAIM IS:—

1. A gas fire having radiant material which is horizontal or oblique to the horizontal and comprises a radiant, portions of which, in use, simulate, or bodies which, in use, simulate, embers, and which radiant material is situated above flame trap material of gauze or perforated sheet form extending across an upwardly-presented mouth of a plenum chamber which extends from side to side of the fire and with which communicates mixing means for mixing a flow of gaseous fuel with air, said flame trap material being such as to allow a gas/air mixture to pass upwardly therethrough, the arrangement being such that, in use, a gas/air mixture from the mixing means is diffused throughout the whole of the plenum

chamber and passes up through said flame-trap material to said radiant material and burns at said radiant or between said bodies to give a moving flame effect above said radiant material and to cause said radiant material to glow.

2. A gas fire as claimed in Claim 1, wherein said radiant material comprises a plurality of discrete radiant bodies which, in use, simulate embers and between which, in use, the gas/air mixture burns.

3. A gas fire as claimed in Claim 1, wherein said radiant material comprises a radiant which is apertured to allow the gas/air mixture to pass through it, and integral portions of which, in use, simulate embers, and at which portions, in use, the gas/air mixture burns.

4. A gas fire as claimed in Claim 2, wherein the said radiant bodies are of various sizes and/or densities whereby, in use, to glow to different degrees according to their individual sizes and/or densities.

5. A gas fire as claimed in Claim 2 or 4, wherein the said radiant bodies are artificial bodies of ceramic material.

6. A gas fire as claimed in any of Claims 1 to 5, wherein there are provided, in addition to the portions or bodies for simulating embers, log- or coal-simulating means, made of heat-resistant fire-proof material, disposed above the flame trap material.

7. A gas fire as claimed in Claim 6 wherein the log- or coal-simulating means is of ceramic material which in use glows as if burning.

8. A gas fire as claimed in Claim 6 or 7, wherein the log- or coal-simulating means is supported on a heat-resistant block which covers a central area of the upwardly-presented mouth of the plenum chamber.

9. A gas fire as claimed in Claim 8, wherein disposed inside the plenum chamber is a baffle plate spaced between an inlet for the gas/air mixture, of said chamber and the flame trap material, and the said chamber carries, above the level of the flame trap material, upstanding elongate parts extending peripherally of said chamber and provided with horizontally-spaced holes for the admission of secondary combustion air to the fire.

10. A set of components for making a gas fire as claimed in Claim 1, said set of components comprising: (a) a unit con-

stituting a base of the fire and having (i) a plenum chamber which extends from side to side of said fire base, (ii) mixing means, for mixing a flow of gaseous fuel with air, communicating directly with said plenum chamber, the arrangement being such that, in use, a gas/air mixture from the mixing means can diffuse throughout the whole of the plenum chamber, and (iii) flame trap material of gauze or perforated sheet form extending across a mouth of said plenum chamber, said flame trap material being constructed and arranged so that the gas/air mixture can pass upwardly therethrough for ignition thereabove and so that an exterior face of said flame trap material can support from beneath radiant material for simulating embers and disposed externally of the said unit; and (b) radiant material comprising a radiant, portions of which, in use, simulate, or bodies which, in use, simulate, embers, for placing upon said flame trap material whereby in use said gas/air mixture can burn to give a moving flame effect above said radiant material and cause said radiant material to glow.

11. A set of components as claimed in Claim 10, wherein said radiant material comprises a plurality of discrete radiant bodies of various sizes and/or densities whereby, in use, to glow to different degrees according to their individual sizes and/or densities.

12. A set of components as claimed in Claims 10 or 11, wherein said radiant material is constituted by discrete radiant bodies which are artificial bodies of ceramic material.

13. A set of components as claimed in any one of Claims 10 to 12, which has, in addition to the said radiant material for simulating embers, log- or coal-simulating means of ceramic material which is for placing above the flame trap material and which in use glows as if burning.

14. A gas fire substantially as herein described with reference to Figures 1 to 4, or to Figures 5 and 6, of the accompanying drawings.

H. N. & W. S. SKERRETT,  
Chartered Patent Agents,  
Rutland House,  
148, Edmund Street,  
Birmingham, B3 2LQ.  
Agents for Applicants.

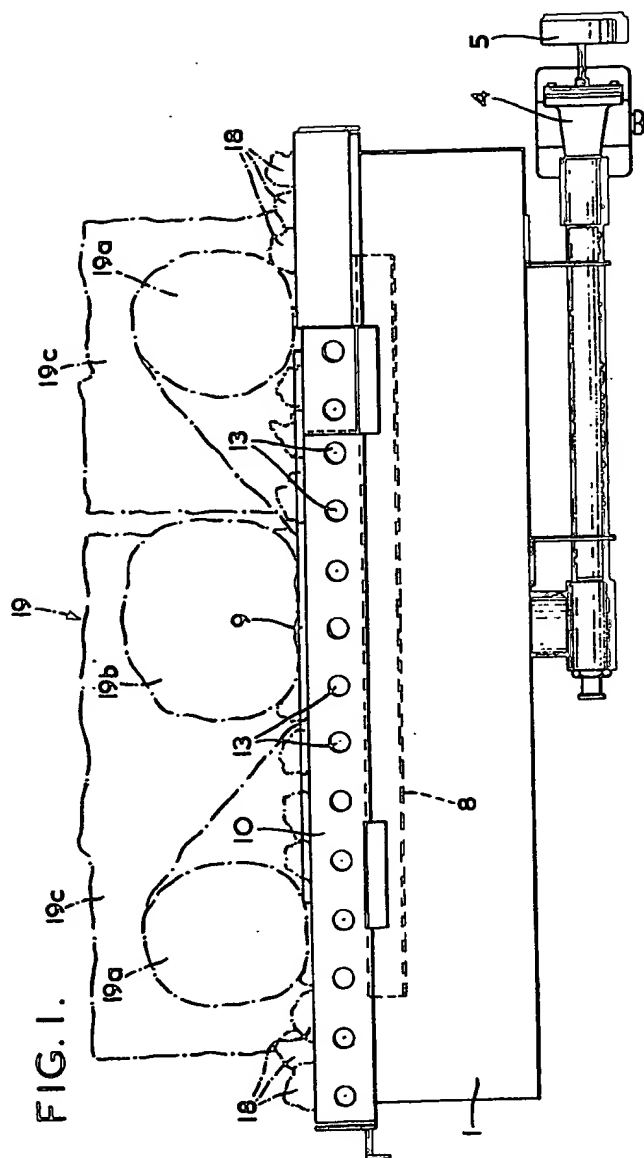
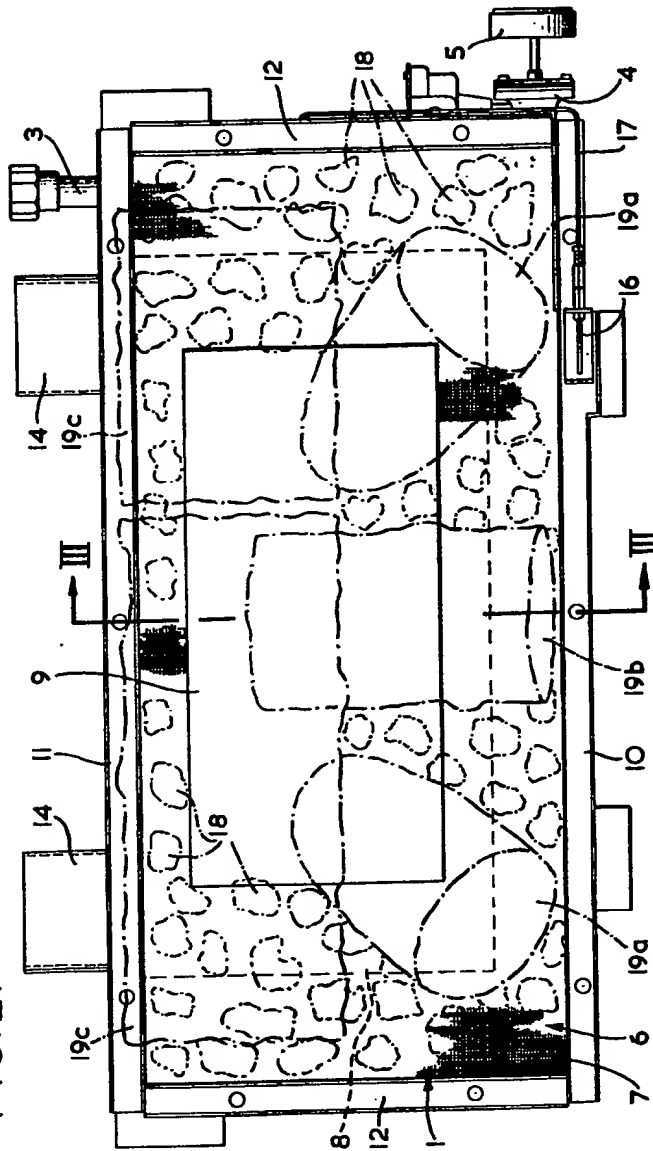


FIG.2.



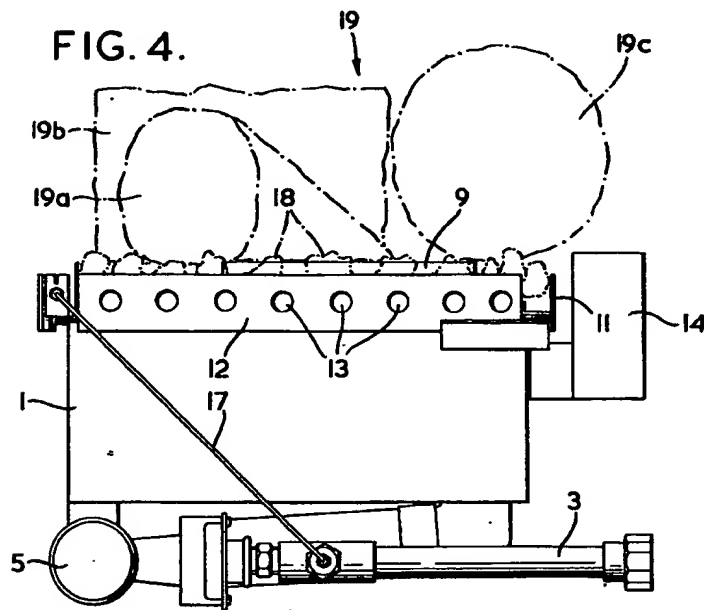
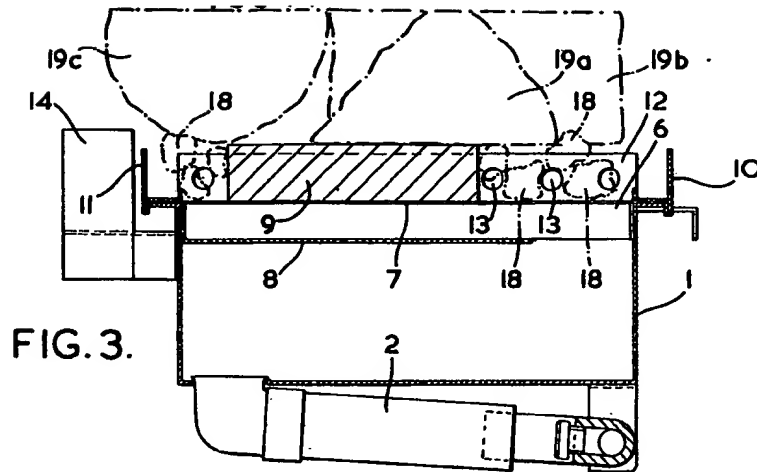




FIG. 5.

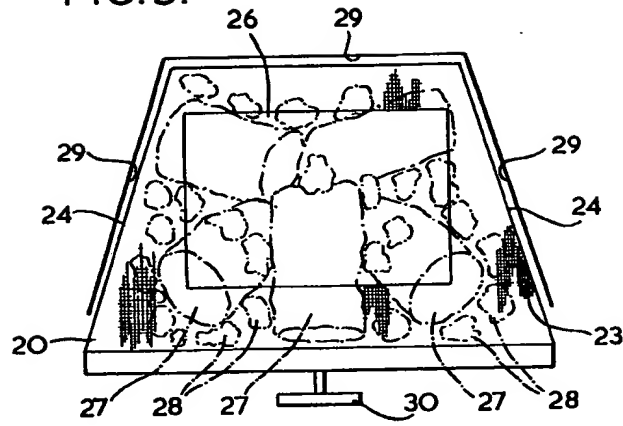


FIG. 6.

